

REMARKS

Claims 1-14 are currently pending, wherein claims 1-4 have been withdrawn from consideration, and Applicant proposes to amend claims 5 and 11. Applicant respectfully requests entry of the above-identified amendment in view of the remarks presented herein below.

In paragraph 2 of the Office Action (“Action”), the Examiner rejects claims 5-14 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,368,945 to Im (“Im”). Applicant respectfully traverses this rejection.

In order to support a rejection under 35 U.S.C. §103, the Office Action must establish a *prima facie* case of obviousness. In order to support a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some motivation or suggestion to modify the applied reference. Second, there must be a reasonable expectation of success. Finally, the modification must teach each and every claimed element. In the present case, claims 5-14 are not rendered unpatentable over Im because the Office Action fails to establish a *prima facie* case of obviousness as discussed below.

Independent claim 5, as amended, defines a method of crystallizing an amorphous silicon film using a sequential lateral solidification apparatus. The method includes, *inter alia*, applying a laser beam to the amorphous silicon film after the laser beam passes through a plurality of slits of a mask, wherein the mask defines a block in the amorphous silicon film; melting first portions of the block, wherein each first portion of the block corresponds to each slit of the mask; crystallizing the first portions of the block by sequential lateral solidification that grows grains along a first direction from interfaces between solid phase amorphous silicon and liquid phase silicon; stepping the mask stage the first direction by several micrometers within the block using the mask stage; repeatedly melting and crystallizing next portions of the amorphous silicon film adjacent to the first portion within the block whenever the mask steps in the first direction by the mask stage until a lateral grain growth stops in the block by collision of laterally grown grains, thereby completing the crystallization within the block in the amorphous silicon film; stepping the X-Y stage block by block in the first direction to crystallize another block of the amorphous silicon film after completing the crystallization in the previous block; and repeatedly melting and crystallizing another block of the amorphous silicon film whenever the X-Y stage steps.

In rejecting claim 5, the Examiner asserts that Im discloses a method as claimed in as much as Im discloses a method of crystallizing an amorphous silicon film which may include moving a mask. The Examiner asserts that Im’s “scanning in one direction, exemplified by Y is

continuous, while movement in the perpendicular direction, X, is taught to be ‘stepped’ with [the] example of 2 cm or 3 micrometer[s] given.”. This, in combination with the disclosure in Im that the computer can control/move the X-Y stage and/or the mask, leads the Examiner to assert that Im discloses a method as claimed. This assertion is unfounded for the following reasons.

Although Im discloses that the computer can control the motion of the sample translation stage and/or the movement of the masking system, nowhere in Im is there any disclosure or suggestion of how the masking system is controlled. The only specific movements disclosed in Im refer to translation of the sample 170. The Examiner appears to assert that because Im generically states that the translation of the sample 170 can be achieved by movement of the sample translation stage or movement of the masking stage it would have been obvious to perform the continuous translation in the Y direction by movement of the sample translation stage and to perform the translation along the paths in the X direction by stepping the masking stage. However, the Examiner fails to provide any motivation for the proposed modification. More specifically, the Examiner fails to provide any motivation or suggestion for translating the sample in the Y direction using the sample translation stage and translating the sample in the X direction using the masking stage. To the contrary, the Examiner merely states that because it is possible it would have been obvious.

The mere fact that a reference can be modified is not in and of itself sufficient to render the resultant modification obvious unless the prior art also suggests the desirability of the proposed modification. See MPEP §2143.01. Nowhere in Im is there any disclosure or suggestion of the desirability of translating the sample 170 in the X-direction using the masking stage as suggested by the Examiner. Accordingly, absent proper motivation to modify the teachings of Im, the rejection of claim 5 is improper.

Furthermore, even if, *arguendo*, one skilled in the art were motivated to translate the sample 170 in the X direction by stepping the mask stage as suggested by the Examiner, the modification would still fail to render claim 5 unpatentable for at least the reason that the modification fails to disclose each and every claimed element as discussed below.

As noted by the Examiner, Im continuously moves the substrate in a Y-direction and steps it in a X-direction after the Y-directional continuous movement. In addition, the laser irradiates the substrate continuously and sequentially in the Y-direction. Thus, the grains in Im would not grow along the same first direction as the X-Y stage of Im are stepped column by column, but are grown perpendicularly to the stepping direction of the X-Y stage. In contrast,

the claimed method recites “crystallizing the first portions of the block by sequential lateral solidification that grows grains along a first direction from interfaces between solid phase amorphous silicon and liquid phase silicon”. Accordingly, independent claim 5 is patentably distinguishable over Im.

Independent claim 11, as amended, defines a method of crystallizing an amorphous silicon film using sequential lateral solidification. The method includes, *inter alia*, applying a laser beam to an amorphous silicon film through a mask having a plurality of slits so that first portions of the amorphous silicon film corresponding to each slit of the mask are melted, wherein the mask defines a block in the amorphous silicon film; crystallizing first portions of the amorphous silicon film by the sequential lateral solidification that grows grains along a first direction from interfaces between solid phase amorphous silicon and liquid phase silicon; stepping a mask in the first direction by several micrometers within the block so that the plurality of slits correspond to next portions of the amorphous silicon film that have not been crystallized; repeatedly melting and crystallizing the next portions of the amorphous silicon film within the block and moving the mask until a lateral grain growth stops in the block by a collision of laterally grown grains, thereby completing the crystallization within the block in the amorphous silicon film; and stepping the substrate block by block in the first direction to correspond to a next block of the amorphous silicon film after completing the crystallization in the previous block, the next block having a portion with uncrystallized silicon film.

In rejecting claim 11, the Examiner asserts that it would have been obvious to modify the sequential lateral solidification method of Im to include the claimed steps of stepping the mask stage in as much as Im discloses that translation of the sample can be achieved by either control the sample translation stage or the masking stage. However, the Examiner fails to provide proper motivation to modify the method of Im. (See discussion above with respect to claim 5). Accordingly, absent proper motivation to modify the method of Im the rejection of claim 11 is improper.

Furthermore, as discussed above with respect to claim 5. Even if, *arguendo*, one skilled in the art were motivated to modify the method of Im as suggested by the Examiner, the modification would still fail to render claim 11 unpatentable for at least the reason that the modification fails to disclose the X-Y stage moves to crystallize different blocks and the mask moves within the block “crystallizing the first portions of the amorphous silicon film by

sequential lateral solidification that grows grains along a first direction from interfaces between solid phase amorphous silicon and liquid phase silicon” as claimed.

Claims 6-9 and 12-14 variously depend from independent claims 5 and 11. Therefore, claims 6-9 and 12-14 are patentable distinguishable over Im for at least those reasons presented above with respect to claims 5 and 11. Accordingly, Applicant respectfully requests favorable reconsideration and withdrawal of the rejection of claims 5-14 under 35 U.S.C. §103(a).

In paragraph 3 of the Action, the Examiner rejects claims 5-14 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. More specifically, the Examiner asserts that “Applicants have added new limitations for stepping the stage in second direction after completing all block’s crystallization in the 1st direction, but give no support therefore.” Applicant respectfully disagrees.

Paragraphs [0035] through [0043] of the specification clearly provide support for the previously added limitations. However, in order to expedite prosecution of the instant application, Applicant proposes to amend claims 5 and 11 to remove the above-identified limitation, rendering this rejection moot.

The application is in condition for allowance. Notice of same is earnestly solicited. Should the Examiner find the application other than in condition for allowance, the Examiner is requested to call the undersigned at (202) 496-7500 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911.

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Respectfully submitted,

By Valerie P. Hayes Reg. No.
for Penny L. Caudle
Registration No.: 46,607
MCKENNA LONG & ALDRIDGE LLP
1900 K Street, N.W.
Washington, DC 20006